

CONDENSERS AND COOLING TOWERS

across the tubes is kept more nearly constant than it is, for instance, in a condenser of rectangular cross-section, and thus stagnation among the tubes is largely obviated. The air and water of condensation are extracted at different points, and a few of the bottom tubes are allowed to flood, so as to cool the water somewhat before passing to the pump. This makes the water-extraction pump more certain in action, but in general it is hardly desirable to cool the water of condensation when it is to be pumped back into the boiler, because of the loss of heat entailed by cooling the feed unnecessarily. When the condenser is designed for high vacua in connection with steam turbines, flooding of the lower tubes would be dispensed with, and a baffle introduced to cut off some of the tubes for devaporizing the air on its way to the air-pump suction. It is seen from the longitudinal section in fig. 10 that the water is here arranged to make four passes from the inlet to the outlet. This arrangement may be modified,

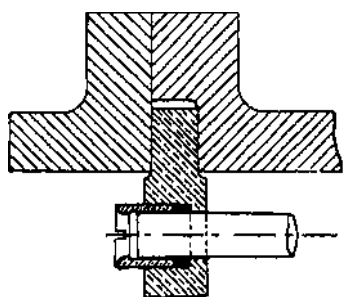


Fig. ii.—Attachment of Condenser Tube

of course, according to circumstances, but, all other things equal, the greater the number of passes the shorter is the condenser and the greater is the number of tubes. A condenser of this shape does not need to be placed in the vertical position. To save head room it can easily be arranged with one of the inclined sides on the foundations, the condenser then lying on its side.

In regard to the best diameter of tubes to be employed, this depends to a large extent on the conditions of the water-supply. The smaller the diameter of the tube the

more effective is the surface from a heat transmission point of view, but few makers care to insert tubes less than 6 in. outside diameter (thick-

ness No. 18 W.G., or 0.049 in.) > even when the circulating water is quite clean. Three-quarters of an inch is the standard used by most manufacturers, but where the water is more or less dirty, and therefore liable to choke the tubes, it may be necessary to adopt tubes of 1 in. diameter.

The usual arrangement of packing, and the gland ferrule for the ends of the tubes, is shown in fig. n. The tube-plate is bored slightly larger than the diameter of the tube, and is also screwed to accommodate the ferrule. To make the gland water-tight, soft yarn treated with linseed-oil or tallow is inserted, and the ferrule screwed down on it. It is advisable to have the inside edge of the ferrule rounded off, as shown, to reduce the loss of energy of flow at the inlet to or outlet from the tubes. Until recently it was the common practice to bolt the tube-plates to the ends of the condenser shell, and with the end covers bolted up against the tube-plates, as is shown in fig. 6, p. 224. There is thus a made joint between each tube-plate and the shell which it is impossible to re-make without detaching the tube-plate and the tubes. A more modern arrangement is that shown in fig. n, where the joint subject to the vacuum is between the cover and the shell, and can be